WEATHER, FORECASTS AND WARNINGS, NOVEMBER, 1911.

By EDWARD H. BOWIE, District Forecaster.

The month as a whole was marked by decided weather changes throughout the country, storms being frequent and attended by well-distributed precipitation and pronounced changes in temperature. Over the North Atlantic steamer routes disturbances were severe and caused delays to shipping.

Over the Icelandic area pressure was below normal from the 1st to 9th and from the 28th to 30th, while during the remainder of the month it was near or above normal. Pressure was relatively low on the 2d, 4th, 8th, 11th, 17th, 22d, 25th–26th, 28th–29th, and at the end of the month, and relatively high on the 9th–10th, 14th–15th, 20th, 23d, and 27th. The lowest pressure occurred on the 4th, 28.30 inches. Fluctuations during the greater part of the month were not marked. Over the British Isles, however, gales were reported on the 5th and 6th and again on the 10th. In Spain a severe storm occurred on the 19th, and a press dispatch states that a sirocco prevailed on the coast of the Adriatic Sea from the 22d to 24th, which caused much damage to shipping.

Over the Azores pressure was high from the 1st to 10th and near or below normal from the 10th to 25th. Pressure was relatively low on the 7th–8th, 10th–11th, 13th–14th, 19th–20th, 24th, and 28th–29th, and relatively high on the 5th–6th, 8th–9th, 11th–12th, 15th–17th, 22d–23d, 27th, and 30th. The lowest pressure, 29.38 inches, occurred during the 13th–14th.

Barometric oscillations in Siberia were of marked frequency and severity. Pressure was relatively low about the 5th, 9th, 15th, 20th, 27th, and 29th–30th, and relatively high on the 3d, 12th, 17th–18th, and 24th.

Alaskan observations showed pressure generally above normal from the 4th to 12th, and generally below thereafter. Pressure was relatively low about the 2d, 6th, 10th–11th, 14th, 17th, 23d–24th, and 28th–29th, and relatively high about the 4th, 8th, 12th, 20th, and 26th. On the 11th Nome experienced the worst storm since that of 1900, which caused a great deal of damage to property.

At Honolulu pressure was below normal on the 3d and 25th and above the seasonal average during the remainder of the month. Pressure fluctuations were of very slight intensity.

In the United States the month opened with temperatures generally below the normal throughout the country, with a storm center off Nantucket which caused rains in New England, and a high pressure area of great magnitude—30.98 inches at Miles City—over the Plains States, accompanied by temperatures from 10 to 20° below the seasonal average. The high-pressure area advanced southeastward to the middle Mississippi Valley by the evening of the 2d, and thence eastward to the middle Atlantic coast by the morning of the 4th, with decreased intensity. This high pressure area was of remarkable development and wide extent, especially when the season is considered, there being on the morning of the 2d but two stations in the whole United States that reported pressure below 30 inches. Frost occurred in the middle tier of States from the Rocky Mountains to the Atlantic coast, and freezing temperatures were reported in northern portions of the Gulf States and on the Atlantic coast as far south as the Carolinas, warnings of which were issued well in advance. During the next several days fair weather prevailed, accompanied by a general change to warmer weather in all States east of the Rockies.

The following weekly forecast was issued November 5:

The severest storm of recent years over western Europe and the British Isles was central Sunday morning over northern Scotland, where the barometric pressure was 28.14 inches. It is causing gales and rains over waters adjacent to western Europe and will undoubtedly result in a considerable loss of life and damage to shipping in that region. This storm will move eastward over northern Europe the first part of the coming week.

In the United States the coming week will be one of pronounced weather changes. Disturbances that now cover the Rocky Mountains and British Columbia will advance slowly eastward and be preceded by unsettled weather, local rains, and mild temperature the first half of the week in the middle West and the Southern and Eastern States; rains are also probable Monday and Tuesday in the north Pacific States. Following this disturbance the pressure will rise rapidly and decidedly colder weather will overspread the Northwestern States Tuesday and Wednesday and advance eastward over the middle West Wednesday and Thursday, and the Eastern States the latter part of the week. It is probable that this change to colder weather will be attended by snows in the Northern States.

The first storm of the month advanced from the southern plateau on the 4th to the nothern Plains States by the 5th, and was central over Wisconsin on the morning of the 6th with increased intensity. By the night of the 6th the disturbance had advanced to the northern portion of the Michigan Peninsula, with lowest reported barometric pressure 29.30 inches. Brisk to high winds occurred over the Upper Lakes and high winds over the Lower Lakes, timely warnings of which were desseminated. Southwest warnings were again issued on the 6th for the Lower Lakes and winds of verifying velocities occurred at most of the stations where warnings were displayed. On the 6th warnings of high winds were ordered for the Atlantic coast from Norfolk to Eastport and were fully verified. The storm moved slowly eastward to the mouth of the St. Lawrence River by the morning of the 8th. The advance of this low across the country was preceded by warmer weather and attended by rains from the Missouri Valley eastward and in the east Gulf and south Atlantic States. A high-pressure area of slight intensity appeared on the North Pacific coast on the morning of the 6th and moved to western Kansas by the 7th, to the Ohio Valley by the 8th, and to northern New England by the morning of the 9th. This high area was attended by a moderate change to colder weather. Southeast storm warnings were ordered for the North Pacific coast during the afternoon of the 6th and, within 24 hours, winds of storm force occurred in connection with the low-pressure area that was central on the morning of the 7th over British Columbia. By the morning of the 8th, low pressure prevailed from the middle slope of the Rocky Mountains to the northern Plateau, and the southern edge of an area of high pressure showed in the Province of Alberta. Although the highest pressure reported in the latter region was 30.10 inches, minimum temperatures of zero were reported from several stations. The same general

pressure distribution continued in the West for four consecutive 12-hour periods, rains and snows being reported in the northern and middle plateau regions and on the North Pacific coast. On the evening of the 7th there were indications of a slight disturbance south of the lower Texas coast and by the morning of the 8th it had advanced to a position south of the Louisiana coast, with slightly increased intensity, good rains being reported from the Gulf States. Advisory warnings of brisk to high winds were issued for points on the Alabama, Mississippi, and extreme western Florida coasts. The storm passed inland over the mouth of the Mississippi River and was central on the morning of the 9th near Cape Hatteras, having caused general rains in the south Atlantic and east and central Gulf States. From Cape Hatteras the disturbance passed northward, attended by rains in the States adjacent to the coast. During the night of the 9th a low-pressure area developed over the Dakotas and by the morning of the 10th was central over the western portion of the Province of Ontario, whence it moved rapidly northeastward. This storm caused snows and rains in the northern Plains States, the upper Mississippi Valley, and the Lake region. It is reported in connection with this storm that snow fell in the Canadian wheat belt to the depth of 1 foot, causing the loss of a large amount of wheat. In the Middle Atlantic States a number of cities experienced such dense fogs on the morning of the 11th that traffic was temporarily impeded. Coincident with the development of this low, temperatures fell from 20 to 32° over the northern plateau and the northern slope of the Rocky Mountains, warnings of which were issued on the 8th. On the morning of the 10th, falls of from 20 to 36° were reported over the Dakotas, Nebraska, and western Minnesota. In the States east of the Rocky Mountains a general rise in temperature was in progress from the 8th to the 11th. On the morning of the 10th a low-pressure area was central over the northern and middle plateau regions with an axis northwest-southeast, attended by precipitation in that region and on the Pacific coast. Gales were reported in the latter district, warnings of which were issued the previous day. By the evening of the 10th the storm's axis extended east-west from Kansas to Utah, there being three separate centers. On the morning of the 11th the axis was northeast-southwest, reaching from Wisconsin through Iowa and Kansas to northeastern New Mexico. The high pressure over Alberta in the meantime had remained practically stationary, but the temperature had fallen to below zero at a number of stations, Calgary in Alberta reporting a reading of 22° below zero. The low-pressure area before mentioned moved rapidly eastward with increasing intensity, preceded by rising temperature and accompanied by gales of great severity on the Great Lakes and the Gulf and Atlantic coasts, warnings of which were issued well in advance of their occurrence. During the afternoon and night of the 11th a number of local storms occurred in Indiana, Iowa, Wisconsin, and Michigan, causing damage to farm property, houses, buildings, and telephone, telegraph, and power services, and the loss of a number of lives. Vessel captains on the Lakes speak of this storm as the "worst blow" in years. The extremely few wrecks reported on the Lakes is a testimonial to the efficacy and timeliness of the warnings of the Weather Bureau. To give some idea of the unusual severity of this storm, vessels were wrecked or driven ashore even when within harbors, where they were supposed to be safe. What would have been the fate of vessels of low power and mediocre equipment on the open Lakes is not difficult to imagine.

23100—12—10

The following weekly forecast was issued Sunday, November 12:

The coming week will be one of pronounced weather changes and low temperatures over practically the entire country. The cold wave that now covers the Middle West will advance rapidly eastward and give the lowest temperatures of the season the first two days of the week throughout the Eastern and Southern States and on these days abnormally low temperatures will continue in the interior districts east of the Rocky Mountains. An extensive disturbance that is now off the north Pacific coast will advance slowly eastward and be attended the first part of the week by stormy weather in the north Pacific States. It will cross the Rocky Mountains Tuesday, the Middle West Wednesday or Thursday, and the Eastern States the latter part of the week. This disturbance will be preceded by a general change to warmer weather, be attended by rains in southern and rains and snows in northern districts, and will be followed by a change to colder weather over the northern half of the country.

Following the passage of the disturbance before referred to, the area of high pressure over Alberta advanced to the northern plateau by the evening of the 11th and thence southeastward to the west Gulf States, whence it passed northeastward to a position off the southern New England coast on the evening of the 14th. Falls in temperature ranging from 20 to 60° occurred over the entire country, with the exception of the Pacific coast and the southern plateau; one station in the Mississippi Valley reporting a fall of 70° in 17 hours. Preceding the above-mentioned area, temperatures were unseasonably high and the sudden and extreme change to lower temperatures accompanying its passage, together with the severe winds, caused extreme suffering over the region of the Plains States, the Mississippi and Ohio Valleys, and the Lake region. Late cotton in Texas is reported to have been killed and the cotton belt as a whole had the coldest weather for the season experienced in years. A number of stations reported the lowest temperatures in connection with this cold wave that have been recorded during the early part of November in many years and the rate of fall broke previous records in a number of cities. Railroads in Colorado and neighboring States had trouble with the snow, as was also the case in Wisconsin, upper Michigan, and Minnesota. Ice formed in the harbor of Duluth, Minn., to a thickness of 6 inches, effectually interrupting the passage of ferryboats. This is the earliest closing of the harbor reported in 20 years. On the coast and in the interior of the Gulf States high winds occurred, being particularly severe in the vicinity of Mobile Bay. On the Great Lakes gales prevailed during the 11th and 12th, while on the Atlantic coast they occurred on the 12th and 13th. Warnings were issued in advance of the occurrence of these winds and timely warnings were given of the colder weather in all sections, among which the following, issued the morning of the 11th for the west Gulf States, is an example:

Cold wave Amarillo, Abilene, El Paso, Fort Worth, Oklahoma, Bentonville, and Fort Smith. Freezing temperature in northern Texas; temperature 8° to 14° Texas Panhandle; 10° to 20° Oklahoma; freezing temperature northern and western portions Arkansas; temperature 20° to 28° northwest portion.

Later in the day the following was distributed:

Cold wave Taylor and San Antonio, and freezing temperature northern portion of sugar regions of Louisiana and Texas next 24 to 36 hours.

A number of planters on receipt of this message started to cut and windrow their cane, but in spite of the large saving effected thereby great damage resulted to the cane crop.

The next low to cross the country appeared on the North Pacific coast the evening of the 12th. By the morning of the 14th it was central over the Plains States, and by the evening of that date was over Lake Superior. Two low centers appeared on the morning map of the 15th, one central near Nantucket and the other northeast of Lake Huron. By the morning of the 16th there was but one center of low pressure, central north of Nova Scotia, with lowest reported pressure 29.20 inches. The low pressure persisted in that region for several days and caused particularly severe gales from the middle Atlantic coast to the Grand Banks. Snows occurred in the Lake region and rains in the north Atlantic States in connection with this storm. On the evening of the 14th a high pressure area of slight intensity appeared in Alberta, and by the morning of the 15th was over eastern South Dakota, with temperatures below zero in the Canadian Northwest and in North Dakota, Minnesota, and eastern and central Montana. On the morning of the 16th the high was over the Michigan Peninsula, and by the following morning over eastern Pennsylvania, whence it passed eastward off the coast by the evening of that date. It was accompanied by much colder weather over the Northern and Middle States east of the Rocky Mountains. A low-pressure area appeared on the North Pacific coast on the 14th, and moved to Wyoming by the morning of the 15th, and the next morning was over Colorado. The storm, thus far in its course, caused precipitation in the North Pacific Coast States and the northern plateau. By the evening of the 16th it had advanced to eastern Kansas with increasing intensity, and on the morning of the 17th was over the upper Mississippi Valley, with lowest pressure 29.36 inches. On the previous day storm warnings were ordered for Lakes Superior, Michigan, Huron, and Erie, and were continued on the 17th for the above-mentioned lakes and extended to Lake Ontario. Warnings were also ordered from Hatteras to Eastport on the Atlantic coast. The storm was central on the evening of the 17th over the northern Michigan Peninsula, and on the morning of the 18th had advanced to the eastern portion of the Province of Ontario, with pressure reading at Stonecliffe of 29 inches. Gales occurred on the Lakes and Atlantic coast in connection with this storm as forecast, and well-distributed rains and snows were reported from the Mississippi Valley eastward. By the morning of the 19th the disturbance had passed to the mouth of the St. Lawrence. No high-pressure area of consequence immediately followed this low, although pressure was above normal in the South Atlantic and East Gulf States.

The following weekly forecast was issued Sunday, November 19:

The indications are that the coming week will be one of mostly fair weather and seasonal temperature throughout the country. Rains will continue, however, in the North Pacific States during the next several days and snow flurries are probable at intervals on the Great Lakes. The next disturbance of importance to cross the country will appear in the Northwest Monday or Tuesday and move thence along the northern border to the St. Lawrence Valley, reaching the latter district about Friday. This disturbance will be attended by local snows in the northern States and be followed by a change to colder weather over the northern half of the country. This change will appear in the Northwestern States about the middle of the week.

A low appeared over Manitoba on the 19th, advanced to the southern Michigan Peninsula by the morning of the 20th, and by the morning of the 21st was central off Nantucket, Mass. The storm moved thence northeastward with increasing intensity and was central on the morning of the 22d south of Newfoundland, the pressure reading reported from Sydney, Cape Breton Island, on that date being 29.18 inches. Before the morning of the 22d the low was of relatively slight intensity. Rains and snows occurred in the region of the Great Lakes, New England, and the northern portion of the Middle Atlantic States. A high-pressure area developed over the eastern slope of the Rocky Mountains and was central on the morning of the 20th over Nebraska and advanced by the morning of the 21st to the middle Mississippi Valley, with increased intensity. By the morning of the 22d it was central over West Virginia, having caused changes to cooler weather over central and southern districts and frosts on the 22d in the east Gulf and south Atlantic States, except Florida. It moved thence slowly eastward to the middle Atlantic coast by the morning of the 23d. The next storm of importance to cross the country appeared on the extreme North Pacific coast on the morning of the 20th, light rains and high winds being reported from that region during the following night and next day. Storm warnings were issued during the early morning of the 20th. On the morning of the 21st this storm had moved to Alberta and by the morning of the 22d was over northwestern Minnesota. Its trough extended to the Texas Panhandle and rains were reported in the southern Plains States and in Texas. On the morning of the 23d the storm was central north of Lake Superior with slightly increased intensity, rains and snows being reported in the Mississippi and Ohio Valleys and also in the Gulf States in connection with a secondary low area which was central in that region. By the morning of the 24th the northern low had moved to the Province of Quebec, the trough formation still in evidence with the secondary, 29.70 inches, at Washington, D. C. The secondary moved eastward and by noon of that date was central off the New Jersey coast with rapidly decreasing pressure. By the evening of that date, it was central off Nantucket, Mass., with lowest reported pressure 29.34 inches, and by the morning of the 25th was over Nova Scotia with lowest reported pressure 29.00 inches. On the morning of the 24th storm warnings were issued for high northwest winds from Jacksonville to Delaware Breakwater and before noon they were extended to Boston and at 1.20 p. m. to Eastport, Me. Severe gales occurred on the Atlantic seaboard and caused considerable damage to shipping in spite of the warnings. Well-distributed rains in southern and snows in northern districts were reported in connection with this storm. On the 22d a high-pressure area was central over the Plateau region and on the evening of that date another high showed over Saskatchewan with temperatures below zero. The high pressure advanced slowly eastward and southeastward and by the evening of the 23d was over the Plains States, temperatures below zero being reported on the morning of that date over North Dakota. The axis of the high extended on the morning of the 24th from Louisiana to northern Nevada, showing indications of the formation of a separate high over Oklahoma, with temperatures below freezing in that section. Falls ranging from 20° to 28° in 24 hours were reported in the central and west Gulf States, and by the following morning the change to colder had advanced to the Atlantic coast, temperatures below freezing being reported in northern Florida and frost in the Gulf and portions of the south Atlantic States. By the morning of the 26th the high had advanced to the central Gulf coast and frosts were again reported in that section, and by the morning of the 27th it was central off the middle Atlantic coast.

Ample and timely warnings were given of the frosts and colder weather. A low advanced along the northern border from Alberta on the 23d to Manitoba on the 24th, western Ontario on the 25th, and eastern Ontario on the 26th.

The following weekly forecast was issued Sunday, November 26:

The coming week will be one of generally fair weather in the Eastern and Southern States, and the first half of the week will be fair in the Middle West. A disturbance that is developing over the Plains States, however, will be attended by snows Monday and Tuesday in the region of the Great Lakes and local rains or snows Monday night or Tuesday in the North Atlantic States. Following this disturbance a change to colder weather will overspread the Middle West Monday and the Eastern and Southern States Tuesday and Tuesday night. The next disturbance to cross the United States will appear on the North Pacific coast Wednesday or Thursday and prevail over the Middle West at the close of the week. This disturbance will be preceded by a general change to warmer weather, be attended by rains in southern and snows in northern districts, and be followed by a pronounced change to colder weather which will make its appearance in the Northwest about December 3. It is probable that this disturbance will cause general rains the latter half of the week on the Pacific slope.

A low-pressure area appeared over Saskatchewan on the evening of the 25th and advanced to the Plains States by the following morning. On the morning map of the 27th two centers appeared—one over Lake Michigan and the other over Oklahoma—and light precipitation in the form of snow was reported over the eastern Rocky Mountain region and the Plains States. On the morning of the 28th the main center was over the Michigan Peninsula, with evidence of a secondary over Georgia. Snows and rains were reported quite generally east of the Rockies, except in New England and in New York and eastern Pennsylvania. By the morning of the 29th one center was over New Brunswick, with lowest pressure 29 inches, and precipitation had overspread New England. Gales were reported during the 27th on the Gulf coast and on the 28th on the Great Lakes and Atlantic coast, warnings of which were issued in advance of their occurrence. This low was followed by a high which was central over British Columbia on the evening of the 26th. It remained stationary for 12 hours and increased in intensity. By the evening of the 27th it had advanced to western Montana, with highest pressure reading 30.90 inches, and with lowest temperatures reported ranging from 14 to 16°. The center of the high remained over the plateau region, although pressure increased rapidly following the eastward movement of the preceding low and was attended by changes to much colder weather to the Atlantic coast, particularly low temperatures for the season being reported in the Gulf States. On the morning of the 29th an offshoot from this high developed over Texas, causing the lowest temperatures of record for the month of November at Galveston and temperatures approximating the lowest ever before recorded for the month at several other stations in that section. By the morning of the 30th the high was over eastern Texas and Louisiana, causing killing frosts to the east Gulf coast and frosts in northern Florida, a killing frost being reported at Gainesville, Fla. The cold weather and frosts were successfully forecast. At the end of the month the high was central off the Louisiana coast. From the morning of the 28th a low advanced along the northern border from Alberta and was central at the close of the month over the Province of Quebec, no precipitation of consequence being reported.

The following is an editorial from the Times-Democrat, of New Orleans, La., dated December 3, 1911, regarding the warnings of the colder weather that occurred on the 13th and 27th:

It is impossible as yet to determine definitely and accurately the damage and loss to the Louisiana cane crop caused by the two recent freezes. It is unquestionably heavy, but how heavy we will not know until a careful examination has shown the condition of the cane. It is believed that it will be possible to determine this point in the next few days, and that we will then know within a few thousand dollars how much Louisiana has lost by the two unexpected and early freezes of last month.

Louisiana, and New Orleans in particular, has counted with great confidence on its sugar crop. The acreage was larger than usual; the cane, although a little backward, was in good condition and promised an exceptionally large tonnage to the acre; and finally, sugar is commanding a better price than for years past. A profit on the crop of between $7,000,000 and $10,000,000 over last year was looked for; and the circulation of that money promised activity in every line of business.

Suddenly and unexpectedly there descended on the sugar belt the freeze of November 13. It was one of the earliest freezes ever known in this section, and caught the planters unprepared, when they had only just begun their grinding. Fortunately the freeze continued only a few hours, so that the loss was not as heavy as it would otherwise have been. Two weeks afterwards, on November 27, came another freeze, more far reaching, more severe, and far more damaging. It is the uncertainty as to the amount of this damage that renders it impossible to figure out the exact loss.

If we look back to the old records, before the Government established the Signal Service or Weather Bureau, we will find that the damage from premature freezes of this kind brought overwhelming ruin to the cane crop, and that in many years the crop was injured three-fourths and more. The planters had nothing to guide them as to the weather, no notice of the coming of a freeze until it was on them. To-day, because we know more of the weather, the loss is not likely to be over 15 per cent.

It is difficult to appreciate how much these weather forecasts mean to the cane growers, for perhaps no crop is in greater danger from sudden changes than sugar cane. Both of the recent freezes were sudden. The wind which carried the cold wave of November 13 to the sugar belt was blowing 40 to 50 miles an hour. It was impossible, therefore, to predict the freeze more than 40 hours in advance; but these 40 hours given the sugar planters to prepare were invaluable and saved Louisiana from millions of dollars of loss. The second freeze was predicted, or rather announced, 2 days in advance of its arrival, and gave the planters ample time to get ready for their enemy. These warnings saved the greater part of the crop, and were valuable not only for the present, but for future years, for they enabled the planters to save the seed cane. But for that we would have had to reduce our cane acreage next year.

The county correspondents of the Louisiana Planter furnish some valuable information on this point. Thus from Iberville we learn that a majority of the planters heeded the warning at once, began to windrow the moment the Weather Bureau informed them a cold wave was on its way here, and they thus saved their crop.

In Assumption a number of planters did not believe the warning, and will lose heavily in consequence of their failure to windrow. But the strongest evidence comes from Lafayette, where the Planter's correspondent remarks:

"Fortunately the United States Weather Bureau gave timely warning of the coming freeze, and those planters who had standing cane were able to put it in windrows before the cold blast struck the country. A few, however, were caught, not fully appreciating the warning and trusting to luck that, after all, Uncle Sam's prediction as to destructive cold approaching might not come true. It is therefore quite certain that there will be some further loss, not only of standing cane, but of much exposed in heap rows."

Probably next time they will give better heeding to these warnings. The weather reports have vindicated themselves and proved their value; and with this protection, and notice properly utilized by the planters, the cane crop will be better protected against sudden changes in weather conditions and the crop made more certain. The Weather Bureau in its predictions, especially as far as freezes go, has made great progress in the last few years, and we may hope for still further improvement as the science of meteorology progresses.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since Jan. 1.	Average departures since Jan. 1.
New England	12	39.0	−0.4	+ 3.3	+0.3
Middle Atlantic	15	41.8	−2.1	+ 7.9	+0.7
South Atlantic	10	52.1	−2.0	+19.4	+1.8
Florida Peninsula [1]	9	68.5	+2.2	+19.8	+1.8
East Gulf	11	53.1	−2.6	+27.0	+2.5
West Gulf	12	53.6	−3.7	+29.7	+2.7
Ohio Valley and Tennessee	15	39.9	−3.9	+19.4	+1.8
Lower Lakes	10	36.4	−2.5	+ 9.5	+0.9
Upper Lakes	13	31.1	−3.2	+17.6	+1.6
North Dakota [1]	8	16.6	−8.8	−10.9	−1.0
Upper Mississippi Valley	14	32.6	−5.1	+17.9	+1.6
Missouri Valley	12	33.0	−4.4	+24.6	+2.2
Northern slope	10	26.5	−5.6	− 4.7	−0.4
Middle slope	6	39.2	−2.6	+23.8	+2.2
Southern slope [1]	8	47.2	−3.0	+28.9	+2.6
Southern plateau [1]	9	46.8	−2.4	− 1.5	−0.1
Middle plateau [1]	10	33.9	−3.1	− 0.8	−0.1
Northern plateau [1]	11	34.4	−2.8	−10.0	−0.9
North Pacific	7	44.6	−0.5	−10.8	−1.0
Middle Pacific	5	53.2	−0.3	−13.7	−1.2
South Pacific	4	59.3	+2.2	+ 2.0	+0.2

[1] Regular Weather Bureau and selected cooperative stations.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
New England	11	4.27	120	+0.70	− 3.50
Middle Atlantic	15	3.52	146	+1.10	− 3.70
South Atlantic	11	2.43	83	−0.50	−15.40
Florida Peninsula [1]	9	5.08	233	+2.90	−10.00
East Gulf	11	4.47	125	+0.90	− 4.30
West Gulf	10	2.45	80	−0.60	− 7.20
Ohio Valley and Tennessee	13	3.50	100	0.00	− 0.60
Lower Lakes	10	2.89	97	−0.10	+ 0.50
Upper Lakes	13	3.53	146	+1.10	+ 1.60
North Dakota [1]	8	0.79	134	+0.20	+ 1.10
Upper Mississippi Valley	15	2.55	124	+0.50	+ 0.70
Missouri Valley	12	0.93	76	−0.30	− 4.60
Northern slope	9	1.15	136	+0.30	− 0.40
Middle slope	6	0.59	60	−0.40	− 4.10
Southern slope [1]	8	0.80	50	−0.80	− 6.30
Southern plateau [1]	10	0.21	34	−0.40	+ 3.20
Middle plateau [1]	11	0.56	66	−0.30	+ 0.90
Northern plateau [1]	11	1.52	94	−0.10	− 2.20
North Pacific	7	5.66	77	−1.70	+ 3.50
Middle Pacific	7	0.77	24	−2.40	− 0.20
South Pacific	4	0.19	15	−1.10	+ 5.80

[1] Regular Weather Bureau and selected cooperative stations.

Average relative humidity and departure from the normal.

Districts.	Average.	Departure from normal.	Districts.	Average.	Departure from normal.
New England	74	−4	Missouri Valley	71	0
Middle Atlantic	72	−3	Northern slope	74	+ 7
South Atlantic	76	−2	Middle slope	62	0
Florida Peninsula	84	+4	Southern slope	58	− 4
East Gulf	72	−4	Southern plateau	51	+ 8
West Gulf	65	−9	Middle plateau	59	+ 1
Ohio Valley and Tennessee	74	+1	Northern plateau	58	−16
Lower Lakes	76	−1	North Pacific	85	+ 1
Upper Lakes	80	0	Middle Pacific	64	−11
North Dakota	87	+8	South Pacific	52	−15
Upper Mississippi Valley	76	+2			

Average cloudiness and departure from the normal.

Districts.	Average.	Departure from normal.	Districts.	Average.	Departure from normal.
New England	6.4	+0.6	Missouri Valley	5.0	+0.2
Middle Atlantic	6.2	+0.9	Northern slope	5.9	+1.1
South Atlantic	5.4	+0.9	Middle slope	4.2	+0.3
Florida Peninsula	6.0	+1.5	Southern slope	4.1	−1.1
East Gulf	5.2	−0.6	Southern plateau	2.2	−0.6
West Gulf	5.0	−0.4	Middle plateau	3.8	−0.1
Ohio Valley and Tennessee	6.7	+1.0	Northern plateau	6.4	+0.6
Lower Lakes	7.6	+0.3	North Pacific	8.2	+0.7
Upper Lakes	7.6	+0.5	Middle Pacific	3.2	−1.3
North Dakota	5.8	+0.4	South Pacific	2.3	−1.0
Upper Mississippi Valley	6.5	+1.3			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Block Island, R. I.	2	52	nw.	Mount Weather, Va.	19	50	nw.
Do	7	50	w.	Do	24	64	nw.
Do	12	62	nw.	Do	25	66	nw.
Do	13	50	nw.	New York, N. Y.	2	60	nw.
Do	18	52	sw.	Do	7	64	w.
Do	25	58	nw.	Do	12	72	nw.
Buffalo, N. Y.	7	64	sw.	Do	13	56	nw.
Do	12	72	w.	Do	16	54	nw.
Do	13	50	w.	Do	18	64	sw.
Do	17	54	s.	Do	19	54	nw.
Do	18	66	sw.	Do	25	60	nw.
Do	19	62	w.	Do	28	60	sw.
Do	28	64	w.	North Head, Wash.	8	64	nw.
Do	29	60	sw.	Do	9	64	nw.
Do	30	56	sw.	Do	11	72	se.
Burlington, Vt.	11	50	s.	Do	12	78	se.
Do	12	54	s.	Do	14	56	s.
Canton, N. Y.	12	54	w.	Do	20	66	s.
Cleveland, Ohio	6	56	se.	Oklahoma, Okla.	11	54	nw.
Do	12	58	sw.	Do	27	62	nw.
Do	18	52	w.	Pensacola, Fla.	12	56	nw.
Corpus Christi, Tex.	12	51	n.	Pittsburg, Pa.	12	50	w
Dayton, Ohio	11	50	s.	Pt. Reyes Light, Cal.	5	50	nw.
Do	12	54	s.	Do	6	50	nw.
Detroit, Mich.	12	56	w.	Do	7	70	nw.
Do	18	50	w.	Do	15	67	nw.
Duluth, Minn.	10	50	w.	Do	16	51	nw.
Do	17	50	nw.	Do	20	58	nw.
Do	18	50	nw.	Do	21	55	nw.
Eastport, Me.	13	50	s.	Reno, Nev.	9	54	w.
El Paso, Tex.	11	51	w.	Seattle, Wash.	20	52	sw.
Flagstaff, Ariz.	10	50	sw.	Sheridan, Wyo.	6	50	nw.
Fort Smith, Ark.	11	55	nw.	Southeast Farallon, Cal.	10	50	nw.
Hannibal, Mo.	11	54	sw.	Do	21	52	nw.
Indianapolis, Ind.	11	52	s.	Springfield, Mo.	11	54	nw.
Kansas City, Mo.	11	50	nw.	Syracuse, N. Y.	28	50	s.
Lincoln, Nebr.	11	50	nw.	Tatoosh Island, Wash.	8	58	w.
Little Rock, Ark.	11	52	nw.	Do	11	52	e.
Memphis, Tenn.	11	60	nw.	Do	12	64	s.
Modena, Utah	10	60	sw.	Do	14	62	sw.
Mt. Tamalpais, Cal.	7	64	nw.	Do	20	70	s.
Do	8	78	nw.	Do	21	51	w.
Do	9	67	nw.	Do	26	56	ne.
Do	11	52	nw.	Do	27	64	ne.
Do	15	57	n.	Do	28	52	ne.
Mount Weather, Va.	7	52	w.	Wichita, Kans.	13	53	s.
Do	8	52	nw.				
Do	12	66	nw.				
Do	18	60	nw.				